CLAIMS

1. An optical receiver arranged to receive and demodulate optical orthogonal frequency division multiplexed signals, and having
a subcarrier reference generator arranged to generate a number of subcarrier reference signals, each for use in demodulating a different one of a number of frequency channels of the frequency division multiplexed signals,
the subcarrier reference generator further being arranged to compensate for degradations in the generated reference signals by averaging a number of estimates derived from different inputs.

2. The optical receiver of claim 1, the generator being arranged to compensate for phase drift by determining estimates at a number of different frequencies and averaging these estimates.

3. The optical receiver of claim 1, the generator being arranged to compensate for noise by determining estimates for a given one of the reference signals at a number of different times and averaging these estimates.

4. The optical receiver of claim 1, the generator being arranged to compensate for phase drift by determining estimates at a number of different frequencies and averaging these estimates, and to compensate for noise by determining estimates for a given one of the reference signals at a number of different times and averaging these estimates.

5. The optical receiver of claim 1, arranged to demodulate differentially coded optical orthogonal frequency division multiplexed signals, the generator being arranged to operate without using a transmitted pilot tone.

6. The optical receiver of claim 1, arranged to demodulate non differentially coded optical orthogonal frequency division multiplexed signals.

7. The optical receiver of claim 1, the generator being arranged to generate the estimated reference signals by stripping detected data from a received signal for each channel.

8. The optical receiver of claim 1, the generator being arranged to generate an estimated phase drift by estimating a rotation of a constellation of points represented in a complex frequency domain.

9. The optical receiver of claim 8, being arranged to receive signals carrying data values which have been encoded before transmission by a rotation in a complex frequency domain, relative to other data values and the receiver having a decoder for decoding by using the other data values to determine an amount of rotation of the received data values, needed to decode the data values.

10. The optical receiver of claim 1, having a coherent optical domain receiving section, and an electrical demodulation section arranged to carry out a Fast Fourier Transform, and to use the subcarrier reference signals for detection of data in the fourier transformed signals.

11. A demodulator for a receiver for orthogonal frequency division multiplexed signals, and having

a subcarrier reference generator arranged to generate a number of subcarrier reference signals, each for use in demodulating a different one of a number of frequency channels of the frequency division multiplexed signals,

the subcarrier reference generator further being arranged to compensate for degradations in the generated reference signals by averaging a number of estimates derived from different inputs.

12. The demodulator of claim 11, the generator being arranged to compensate for phase drift by determining estimates at a number of different frequencies and averaging these estimates, and to compensate for noise by determining estimates for a given one of the reference signals at a number of different times and averaging these estimates.

13. The demodulator of claim 11, arranged to demodulate differentially coded optical orthogonal frequency division multiplexed signals, the generator being arranged to operate without using a transmitted pilot tone.

14. The demodulator of claim 11 in the form of software.

15. A subcarrier reference generator for a demodulator for orthogonal frequency division multiplexed signals, the generator being arranged to generate a number of subcarrier reference signals, each for use in demodulating a different one of a number of frequency channels of the frequency division multiplexed signals,
the subcarrier reference generator further being arranged to compensate for degradations in the generated reference signals by averaging a number of estimates derived from different inputs.

16. The subcarrier reference generator of claim 15, arranged to demodulate differentially coded optical orthogonal frequency division multiplexed signals, and being arranged to operate without using a transmitted pilot tone.

17. A subcarrier reference generator for generating subcarrier reference signals for use in demodulating optically transmitted orthogonal frequency division multiplexed signals, by generating a number of subcarrier reference signals, each for use in demodulating a different one of a number of frequency channels of the frequency division multiplexed signals,
and comprising means for compensating for degradations in the generated reference signals by averaging a number of estimates derived from different inputs.

18. An optical receiver arranged to receive and demodulate optical orthogonal frequency division multiplexed signals carrying QAM data values encoded by a mapping in a complex frequency domain according to corresponding other data values, the receiver having
a subcarrier reference generator arranged to generate a number of subcarrier reference signals,
a demodulator for demodulating the optical orthogonal frequency division multiplexed signals using each of the subcarrier reference signals for a respective frequency channel of the frequency division multiplexed signals, and
a decoder for decoding after the demodulating, by determining from the corresponding other data values, an inverse mapping in the complex frequency domain needed to decode the data values.

19. The optical receiver of claim 18, the mapping and inverse mapping comprising a rotation.

20. The optical receiver of claim 19, the rotation being any of 0, 90, 180, or 270 degrees.

21. An optical transmitter arranged to transmit an optical orthogonal frequency division multiplexed signal carrying QAM data values, the transmitter having:
an encoder for encoding the data values by carrying out a mapping in a complex frequency domain according to corresponding others of the data values, and
a modulator for modulating the encoded data values to form the optical orthogonal frequency division multiplexed signal having a number of frequency channels.

22. The optical transmitter of claim 21, the mapping comprising a rotation.

23. A method of generating subcarrier reference signals for use in demodulating optically transmitted orthogonal frequency division multiplexed signals, by generating a number of subcarrier reference signals, each for use in demodulating a different one of a number of frequency channels of the frequency division multiplexed signals,
and by compensating for degradations in the generated reference signals by averaging a number of estimates derived from different inputs.

24. The method of claim 23, having the step of compensating for phase drift by determining estimates at a number of different frequencies and averaging these estimates.

25. A method of offering a data transmission service over an optical link, the data being transmitted using optical orthogonal frequency division multiplexed signals, and being received using an optical receiver having a subcarrier reference generator arranged to generate a number of subcarrier reference signals, each for use in demodulating a different one of a number of frequency channels of the frequency division multiplexed signals,

the subcarrier reference generator further being arranged to compensate for degradations in the generated reference signals by averaging a number of estimates derived from different inputs.